Outdoor Lighting
California Energy Efficiency Standards 2005

Building Grounds Lighting

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Description

- Addresses lighting for outdoor building grounds, including hardscape areas (i.e., pedestrian walkways, stairs, ramps, and patios).
- LPD maximums vary by four lighting zones.
- Controls needed during day and curfew hours.
- Sports lighting and lighting within 5 ft of the building perimeter are not included in this measure.

Design Criteria

- Walkway design criteria is based on IESNA RP-8-00 “Roadway Lighting.”
- Illuminance criteria is selected for different pedestrian conflict zones and use types.
- Average horizontal illuminance (fc).
- Minimum vertical illuminance (fc) at 4.9 ft.
- Uniformity ratio (average to minimum horizontal fc).

Design Criteria (cont.)

- Lighting design criteria is selected for the four lighting zones:
  - LZ1 = low pedestrian conflict in rural/semi-rural housing.
  - LZ2 = low pedestrian conflict in low-density housing.
  - LZ3 = Low pedestrian conflict in medium density housing.
  - LZ4 = High pedestrian conflict in medium density housing.

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Design Criteria Table

Lighting Zone	Average Horizontal Illuminance	Minimum Vertical Illuminance (4.9 ft above pavement)	Horizontal Illuminance avg/min ratio
1	0.20	0.06	10:1
2	0.30	0.08	6:1
3	0.40	0.10	4:1
4	0.50	0.20	4:1

Lighting Equipment

Lamps and ballasts:

- Metal Halide lamps, horizontal burn position.
- Mean lumens.
- CWA ballasts.

Luminaires:

- IESNA type III, full cutoff.
- Light loss factor of 0.70.

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Lighting Models

- Based on typical sidewalk dimensions of 5 ft wide, with 15 ft poles, spaced 60 ft to 90 ft apart.
- LPD is calculated based on only the sidewalk square footage for each particular cross-section.

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Lighting Models Table

Zone	Luminaire Type	Lamp	Pole Height	Pole Spacing
1	Type III	50W MH	15 ft	90 ft
2	Type III	50W MH	15 ft	80 ft
3	Type III	50W MH	15 ft	70 ft
4	Type III	50W MH	15 ft	60 ft

Calculations

- Used Lighting Analysts AGI-32 v1.5 software.
- Initial design is based on “common” pole heights, lamp wattages, and pole spacing.
- Initial criteria to meet are average illuminance and minimum vertical illuminance (adjust wattage and spacing).
- If not met, check uniformity and adjust.
- Uniformity criteria is very hard to meet without over-lighting the sidewalk, especially in LZ1.

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Lighting Calculations and Allowed Power Table

	LPD		Average Horizontal Illuminance		Minimum Vertical Illuminance		Horizontal Illuminance Ratio	
Zone	Calculated	Recommended	Criteria	Calculated	Criteria	Calculated	Criteria	Calculated
1	0.24	0.30	0.20	0.66	0.06	0.00	10:1	12:1
2	0.27	0.35	0.30	0.74	0.08	0.10	6:1	9:1
3	0.31	0.40	0.40	0.84	0.10	0.20	4:1	4.6:1
4	0.36	0.45	0.50	0.98	0.20	0.30	4:1	3.5:1

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Recommendations

Controls

- Photosensor, time clocks, or astronomical time clocks to turn off lighting during daylight hours.
- Motion sensors turn off or reduce lighting power during curfew hours.

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Lighting Controls Requirements

	LZ1	LZ2	LZ3	LZ4
Walkway – Pre-Curfew	100%	100%	100%	100%
Walkway – Post-Curfew	10%	50%	50%	50%
Stairs/Ramps – Pre-Curfew	100%	100%	100%	100%
Stairs/Ramps – Post-Curfew	100%	100%	100%	100%
Landscape Lighting – Pre-Curfew	0%	50%	100%	100%
Landscape Lighting – Post-Curfew	0%	0%	0%	50%
Recreation Sports Lighting – Pre-Curfew	0%	100%	100%	100%
Recreation Sports Lighting – Post-Curfew	0%	0%	0%	0%

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